The NICHD Connection

July 2017

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Thirteenth Annual Fellows Retreat Recap

The NICHD Thirteenth Annual Meeting of Postdoctoral, Clinical, and Visiting Fellows and Graduate Students took place on May 1, 2017, at the National Museum of the American Indian in Washington, D.C. This year, the event included a morning keynote by Nobel Laureate Dr. Peter Agre, three outstanding presentations by NICHD fellows, nine round table career discussions, presentations by several of our Three-minute-Talk competitors, and an entertaining career keynote by comedian Dr. Adam Ruben.

Several fellows who attended the event recapped the talks for *The NICHD Connection*. We are excited to bring you the 2017 Annual Fellows Retreat presentations. Enjoy!

Dr. Peter Agre and His "Facebook of Science" BY KATHRYN TABOR, PHD

Dr. Peter Agre, director of the Malaria Research Institute at the Bloomberg School of Public Health, spoke during the 2017 NICHD Fellows Retreat keynote about how the people in his life shaped his career. Family, colleagues, local leaders, and scientists from around the world proved instrumental to his life in science.

During his biomedical studies at Johns Hopkins University, Agre saw first-hand that people from disparate and often opposing cultures around the world—a Spanish immigrant, a Palestinian from Lebanon, a Jew from Brooklyn, and an Italian film



Dr. Peter Agre

actor—could become close friends through working together in the lab. These colleagues proved essential to his discovery of the water channel, aquaporin, for which he won the 2003 Nobel Prize in Chemistry.

The story began while he was searching for the molecular identity of the blood group antigen Rh. Frustrating his attempts to isolate Rh was a second amazingly abundant membrane protein. The sequence of this mystery protein was related to proteins from diverse species, but with no known function. Agre's friend, Dr.

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Thirteenth Annual Fellows Retreat Recap (continued from page 1)

John Parker, excitedly asked if this mystery protein might be the long-sought water channel.

The Agre lab tested this by overexpressing the protein in frog eggs. When placed in water, the oocytes exploded rapidly "like popcorn," which triggered jubilation in the lab and launched a new phase of research. The discovery of the intensely hunted water channel, aquaporin 1, spurred key collaborations both locally and around the world. Research focused on resolving the aquaporin family members and their expression patterns, biophysical functions, structures, and roles in health and disease.

While his father, a chemistry professor, encouraged him to pursue a science career, his mother, committed to the well-being of others, urged Agre to use his talent for the welfare of those in need.

Agre decided to focus his research on aquaporin in malaria. Aquaglyceroporin, a type of aquaporin, provides the pathway for glycerol uptake into the malaria parasite. Aquaglyceroporin-null parasites are deficient in glycerol uptake, hindering proliferation, which makes this protein a promising target for antimalarial drugs. As Director for the Johns Hopkins Malaria Research Institute, he established field stations in Zambia, Zimbabwe, and Congo, where malaria is epidemic, especially in children. Through building connections with local community leaders and researchers, his fieldwork significantly reduced the malaria burden in Zambia.

Agre ended the keynote with a few stories about his travels as President of the American Association for the Advancement of Science, a role in which he served from 2009 to 2010. At the time, a new program of science diplomacy had been developed, sending American scientists to visit scientists in other countries. He recounted his meetings with the president of Cuba, Fidel Castro, and the former Iran minister of foreign affairs, Ali Akbar Salehi—both scientists. In both encounters, though they disagreed on many things, the importance of science and the benefits of healthcare were two issues they agreed on wholeheartedly. Even during his difficult visit to North Korea, he met talented scientists with shared ambitions.

Agre proposed that science diplomacy is simply making contact and developing human networks around the world. He said "looking back, it is the people that [he] met along the way that are just as important as the science."

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Thirteenth Annual Fellows Retreat Recap (continued from page 3) BORC, It's Like an Uber for Lysosomes BY FATIMA CHOWDHRY, MD

Lysosomes, cellular organelles found in the cytoplasm, contain enzymes known for their degradative properties. One aspect of lysosomal functioning that has gained traction in the past few years is lysosomal positioning in relation to cellular distribution and movement. Lysosome positioning can change due to nutrient availability. With nutrient abundance, the lysosomes distribute throughout the cell. When nutrients are deficient, they cluster around one area. It is not clear why lysosomes change their position, but it may be due to metabolic signaling.

Dr. Jing Pu, a postdoctoral fellow in Dr. Bonifacino's lab, identified the BLOC-One Related Complex (BORC). This complex consists of eight small proteins and regulates lysosomal positioning. It helps to direct lysosomes from the center of the cell to the periphery, which means that the ability of lysosomes to move throughout the cell is diminished in cells lacking BORC due to a deletion.

This research has relevance to a critical disease—cancer. Metastatic cancer cells are aggressive and invade other tissues. Lysosomes release their enzymes outside the cell to digest extracellular matrix and promote cell migration. If there were a BORC block, then lysosomes would be unable to position themselves throughout the cell to release enzymes into the extracellular matrix, potentially limiting cancer cell migration.

Pu's latest research discovered how BORC regulates lysosome positioning by recruiting the small GTPase Arl8 to the lysosome surface, thus promoting kinesin-dependent movement of lysosomes toward the cell periphery. Pu emphasized that amino acids are important nutrients that regulate lysosome positioning, and she will continue to focus on how amino acids regulate interaction between BORC and Ragulator, a protein complex known to interact with specific GTPases.

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Thirteenth Annual Fellows Retreat Recap (continued from page 4)

With Help from Scd6, mRNA May Play a Role in its Own Fate BY ALLISON DENNIS

The cell generates more messenger RNA (mRNA) than is necessary to maintain the proper assortment of proteins. But what happens to the unnecessary mRNA? Destroying it is an absolute solution; however, preventing it from reaching the translational machinery is a tunable solution, allowing the flexibility to respond as demand for mRNA changes.

Dr. Quira Zeidan, a postdoctoral fellow in the Hinnebusch lab, is unraveling how the binding and dissociation of key protein players can sway the balance of an mRNA's fate. Zeidan is focusing on Scd6, a protein player that has been shown *in vitro* to play a role in two mRNA paths: degradation (by binding a decapping enzyme complex, leading to mRNA decay) and translation blocking (by blocking ribosome recognition).

Zeidan developed a system to evaluate the outcomes of mRNA that associate with Scd6 *in vivo*. In the system, Zeidan tricked Scd6 into binding a specific mRNA. She fused Scd6 to a protein with a known mRNA binding sequence, and she inserted that sequence in front of the *GFP* and *lacZ* reporter genes. Zeidan monitored changes in GFP or lacZ expression and compared those changes to mRNA levels.

Surprisingly, the fates of each *in vivo* reporter highlighted a different facet of the activities implicated for Scd6 *in vitro*. Tethering Scd6 to the *lacZ* mRNA resulted in reduced protein expression without any observation of mRNA decay, a finding dependent on the DEAD-box RNA helicase Dhh1. In contrast, tethering Scd6 to the *GFP* mRNA lead to both reduced protein and mRNA levels, which required the decapping enzyme, Dcp2 as well as Dhh1.

Zeidan's research revealed a valuable lesson from a seasoned experimentalist. When Zeidan began planning her experiment, the *GFP* reporter plasmid was readily available, but she recognized the *lacZ* gene could give more quantifiable results. Instead of waiting, she hit the bench to first unravel the story using the less-than-ideal *GFP* reporter while continuing to develop the *LacZ* expression system. Upon following up with the *lacZ* reporter, what could have been a redundant experiment turned into a very elegant story: the ultimate fate of Scd6 bound mRNAs is not the same for all mRNAs *in vivo*, opening the door to further exploration.

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Thirteenth Annual Fellows Retreat Recap

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New Method of Mapping Nucleosomes BY COPELAN GAMMON

A single human cell contains about two meters of DNA; the human body is estimated to contain 100 trillion meters of DNA. **Dr. Răzvan V. Chereji** puts this in perspective for the audience of the annual NICHD Fellows Retreat, saying this is "enough to go from here to the sun and back more than 300 times." Mapping nucleosomes, the basic unit of DNA packaging, presents a significant challenge—one that Chereji addresses with new methodology and predictive modeling.

Chereji, a research fellow in Dr. David Clark's lab, the Section on Chromatin and Gene Expression, is interested in the intersection of theoretical physics and quantitative biology. Chereji earned a PhD in physics from Rutgers University and ultimately wants to apply his training in rigorous computational techniques to traditional biology to better understand gene expression regulation and chromatic organization.

Chereji's current research has yielded a new method of mapping both single nucleosomes and linkers of neighboring nucleosomes within the same cell, *in vivo*. Nucleosome positions have a strong effect on all DNA-related processes. This new method of chemical mapping produces precise, high-resolution results compared to the commonly used MNase-seq, which combines chromatin digestion with pair-end sequencing. Using statistical mechanics, Chereji and his colleagues successfully created a predictive model of genome-wide nucleosome organization in yeast.



Dr. Răzvan V. Chereji

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Dr. Adam Ruben

Thirteenth Annual Fellows Retreat Recap

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Finding Your Passion in "Purgatory" BY ZELIA WORMAN, PHD

Our afternoon keynote speaker, **Dr. Adam Ruben**, earned a PhD in Biology from Johns Hopkins University, but he may be best known for his book "Surviving Your Stupid, Stupid Decision to Go to Grad School." He is a comedian, participant in the science channel show *Head Rush*, writer for a *Science Careers* humor column, and the associate director at Sanaria, a biotech company with the mission to eradicate Malaria through vaccination. Although he began his talk describing his grad school experiences, he immediately made the leap to how he became successful through a fun combination of coincidences, luck, and hard work.

One of the most hilarious moments of his talk was when he articulated a generalized postdoctoral sentiment: a postdoc is a temporary position (that he called purgatory) that's supposed to lead to an assistant professor job, where the other alternative is just failure. He stated that this can't be the culture in science when only 15% of PhD graduates get a position as a professor. "Alternative career" is not so alternative anymore.

Complications begin when we realize that academic positions are limited for scientists, but we are encouraged to get kids interested in STEM fields to become future scientists. The problems continue when we fail to train these kids to remain in STEM, even if they're not interested in academia and would instead like to explore different fields, such as writing, policy, patent law, etc.

According to Ruben, the training culture of graduate school and postdoctoral studies needs to change so that young minds, amazed by the cool guy that freezes a banana in liquid nitrogen, avoid feeling stuck and disappointed after years of hard work and studying. He argues that we shouldn't end up looking at ourselves after seven years and ask: how did I end up spending my time knowing things I don't care about? Or why did I go to meetings just for the food and free beer?

Alas, this is exactly what he (and some of us) did. After seven years in graduate school, he realized that he wanted to be a scientist who

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Thirteenth Annual Fellows Retreat Recap (continued from page 7)

does things beyond the bench, and not one that focuses on pathways and theoretical work. He pointed out there's no wrong way of being a scientist, but we need to know which kind we are and go for it! So, he went to every meeting for the free beer and food, but he ended up meeting a person from the company he currently works at. He got married, had kids, continued with his comedy, took writing classes, and did so much more. And eventually, the combination of all the things he did and people he met along the way got him to where he is now.

From his talk, we received amazing advice on how to network (please don't throw your business cards at strangers—connect and talk to people!), how to graduate (take control of your future and come up with a plan!), how to stand out (do things you are passionate about), and how to order super fancy incubators that "hold temperature in Celsius AND Fahrenheit" from people who have absolutely zero idea why this is funny (pun intended).

Do your thing, all the time, as much as you can. Learn new things; take a class just for fun. Be yourself, write, jog, and volunteer for something you believe in, even if it's completely unrelated to science. It will make you stand out and make you YOU, not another resume in a pile. Experience things; get out of your postdoctoral shell and **DO everything**.

There's no wrong answer... Only you can know what's best for YOU.

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Thirteenth Annual Fellows Retreat Recap

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Three-Minute-Talk Recaps in Three Sentences BY PUSHPANATHAN MUTHUIRULAN, PHD

Communicating science and its relevance in three minutes, and now, in three sentences

AFROUZ ANDERSON, PHD POSTDOCTORAL FELLOW, GANDJBAKHCHE LAB

The placenta is an important organ that facilitates oxygen exchange between fetal and maternal blood, and impaired placental function is associated with fetal growth restriction and poor neonatal outcome. To address challenges in measuring placental oxygenation, Dr. Afrouz Anderson developed a new wireless portable device—called an oximeter—that uses near-infrared light to measure placental oxygen in the mother's abdomen. This device has potential for use during preeclampsia, or when the fetus is not growing properly.



Dr. Afrouz Anderson

ARUP CHAKRABORTY, PHD RESEARCH FELLOW, DEPAMPHILIS LAB

Cancer is a relentless monster that can thrive in conditions that are lethal to normal cells. Dr. Arup Chakraborty, who studies the role of geminin protein in mouse embryonic stem cells, has found that geminin inhibition can selectively kill cancer stem cells, which serve as the precursors for tumor formation, metastasis, and recurrence. In future work, studying geminin function in human embryonic stem cells could uncover novel therapeutic options for fighting cancer in humans.



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HADIS DASHTESTANI, MS GRADUATE STUDENT, GANDJBAKHCHE LAB

Antisocial personality disorder (ASPD) is characterized by a violation of the rights of others and lack of conformity to social norms. To understand the neural basis behind ASPD, Hadis Dashtestani performed neuroimaging studies using functional near infrared spectroscopy (fNIRS) while implementing moral judgment (MJ) tasks with personality assessments of psychopathic traits in a cost-effective and patient-friendly environment. Dashtestani's research has opened up the new possibility of classifying degrees of psychopathy in incarcerated populations based on neural activity.

JEREMY WEAVER, PHD POSTDOCTORAL FELLOW, STORZ LAB

Small proteins act as regulators of larger proteins in both prokaryotes and eukaryotes, but small proteins have traditionally been overlooked due to challenges in their annotation and biochemical detection. To gain insight into small protein regulators, Dr. Jeremy Weaver uses a mass spectrometry-based proteomic approach with E. coli lysate to selectively enrich new small proteins that would likely remain undetected by other techniques. Weaver's research provides a new path for researchers to explore the prevalence of small proteins in any type of organism or cellular components.





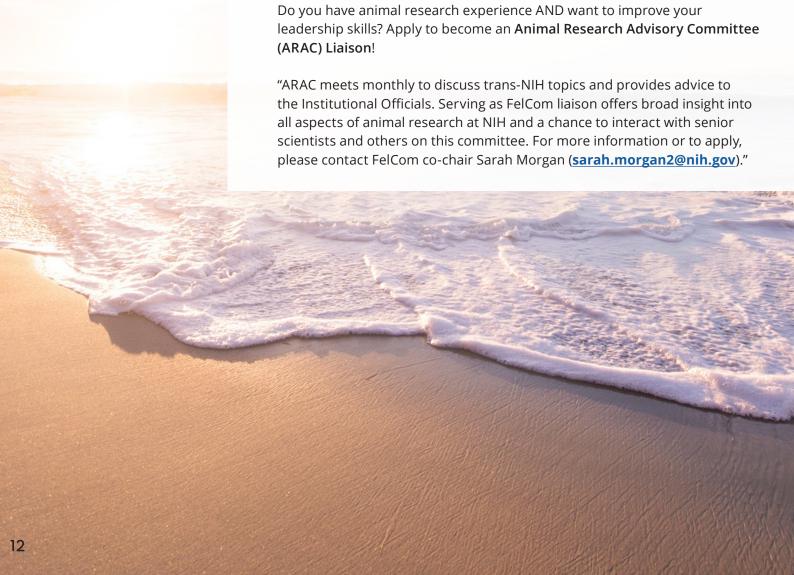
The Rep Report By Suna Gulay, PhD

As the current NICHD Basic Sciences Representative, every month I represent NICHD postdoctoral fellows at the Fellows Committee

subscribe to the FELLOW-L listserv at https://list.nih.gov.

(FelCom) meeting. A variety of career development activities and services geared towards fellows are discussed in these meetings. I will use this space to share with you such NIH-wide opportunities to gain career skills. To hear about NIH-wide training events in the timeliest manner possible, please

THIS MONTH'S OPPORTUNITY FROM THE FELCOM COMMITTEE:





Graduate Miranda Broadney, foreground, with fellow graduates Fady Hannah-Shmouni (left) and Cemre Robinson (center)



Graduate Ijeoma Muo, MD, center, with her mentor Jay Chung, MD, PhD (NHLBI), right, and guest speaker Henry Kronenberg, MD, of Massachusetts General Hospital

Life Outside Lab

2017
Endocrine Fellows'
Graduation
JUNE 9, 2017

PHOTOS BY JEREMY SWAN



Graduating Endocrine fellows with mentors and faculty



Guest speaker Henry Kronenberg, MD, left, with graduate Yulong Li, MD, MS, and her mentor, William F. Simonds, MD (NIDDK)



Graduate Cemre Robinson, MD, center, with Pediatric Endocrinology Training Program Director Maya Lodish, MD, MHSc, and staff clinician Alison Boyce, MD (NIDCR)



Adult Endocrinology Training Program Associate Director Jenny Blau, MD, left, with graduates Fady Hannah-Shmouni, MD, and Sri Harsha Tella, MBBS, and Brittney Davis, Program Coordinator



Guest speaker Henry Kronenberg, MD, left, with graduate Miranda Broadney, MD, MPH, her mentor, Jack Yanovski, MD, PhD (NICHD), and program director Maya Lodish, MD, MHSc

July Announcements (continued from page 14)

THIS SUMMER: RESPONSIBLE CONDUCT OF RESEARCH TRAINING FOR NEW POSTDOCS

"Discussion of Ethical Research Practices: Making Good Choices" Wednesday, August 2, 1:30 - 3:00 p.m. Building 31, room 2A48

This Mandatory training is for all postdocs who started after January 1, 2016.

This is an interactive session that promotes both self-directed and teambased learning required for all new postdoctoral fellows, through the Office of Education. Led by Dr. Gisela Storz, this session will include case studies and reading assignments related to research integrity and discussions on ways to reduce risk factors.

The session will begin with a brief discussion on pre-assigned reading materials, followed by small-group, team-based learning exercises involving complex cases that promote discussions of either fabrication, falsification, plagiarism, mentoring expectations, and/or trainee responsibilities. The workshop will include good practices of data management and presentation, including lab notebook management—both physical and electronic.

For additional details and planned reading assignments, contact Dr. Yvette Pittman (yvette.pittman@nih.gov).

SAVE THE DATE: SUMMER POSTER DAY, AUGUST 10

Summer Poster Day 2017 will be held on Thursday, August 10, at the Natcher Conference Center (Building 45) on the main campus in Bethesda from 9:00 a.m. to 3:00 p.m. Registration is now open.

The deadline for summer interns to submit poster titles for Summer Poster Day 2017 is Wednesday, July 12, at 5:00 p.m. You can read more about Summer Poster Day at https://www.training.nih.gov/summer_poster_day.

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July Announcements (continued from page 15)

INTRAMURAL AIDS RESEARCH FELLOWSHIP FOR GRADUATE STUDENTS & POSTDOCS: APPLICATIONS DUE BY JULY 16

Are you looking for an opportunity to gain experience in grant writing while competing for an intramural funding award? The Intramural AIDS Research Fellowship (IARF) program is a collaborative effort of the Office of AIDS Research, the Office of Intramural Training & Education, and the Office of Intramural Research, designed to further cross-disciplinary research into HIV and AIDS at the NIH.

The aim of the program is to recruit graduate students and postdoctoral researchers from all scientific disciplines to the broad field of AIDS research and to provide a grant-writing opportunity for intramural fellows whose work can be directly related to HIV and AIDS. The fellowship is open to all Graduate Partnerships Program students and postdoctoral fellows who are part of the intramural research program at NIH. Full time employees (FTEs), such as Research Fellows and Clinical Fellows, are NOT eligible for the fellowship. There are no citizenship requirements.

Awardees will be individuals who show outstanding scientific potential through both an imaginative and thoughtful research plan and a well thought out career development plan. See link below for more information:

https://www.training.nih.gov/aids_fellowship_home

Application Deadline: July 16, 2017 at 5pm EDT.



July Events

TUESDAYS AND THURSDAYS, JULY 11 - 27, 4 - 6 PM

"College Teaching for the 21st Century"

Dr. Kate Monzo of the University of Maryland will lead our three-week summer workshop series, "College Teaching for the 21st Century." She is a colleague of Dr. Quimby, the creator of this course, and the evaluations from previous years are always outstanding. For those of you anticipating a career involving teaching, this is a great learning opportunity for you! Plus it would be a great addition to your C.V., for professional development. Teaching institutions look at your training and experience when they are hiring.

Participants will read current research related to college teaching and learning, write well-designed learning outcomes, develop effective assessment strategies, and design active learning activities for the classroom. Also, to help you prepare for the academic job market, the last session will focus on writing a teaching statement.

This series requires pre-registration; there are only 2 slots left. If you are interested, please contact Dr. Yvette Pittman (yvette.pittman@nih.gov).

THURSDAY, JULY 13, 9 AM - 1:30 PM

"Write Winning NIH Grant Proposals"

This workshop will address both practical and conceptual aspects that are important to the proposal writing process. Attendees will receive the "Grant Writer's Workbook" – an invaluable, up-to-date reference tool for those who intend to write NIH grant proposals.

The way in which NIH research-grant proposals are both prepared and reviewed will be specifically covered in the seminar. Topics to be addressed include:

- » A detailed format for the preparation of the 12-page application
- » Description of how to prepare a compelling Specific Aims section
- » A discussion of funding the applications of New/Early Stage Investigators
- » Insights into which review criteria are most important
- » How to include review of literature and presentation of preliminary data in the Approach section
- » Tighter linkage of sections of the application to each of the five core review criteria

If you would like to register, please email Dr. Yvette Pittman at yvette.pittman@nih.gov. There are only 25 slots for NICHD fellows.

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July Events

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WEDNESDAY, JULY 19, 11 AM

"NICHD Fellows: Informational Session for Future PRAT Applicants" Building 31, room 2A48

The NIGMS Postdoctoral Research Associate (PRAT) Program supports postdoctoral fellowships within the NIH Intramural Research Program. Applicants must be citizens or permanent residents of the United States with no more than two years of postdoctoral experience at NIH by the time of appointment to the PRAT program. *The deadline is October 3.* More information about the program can be found at http://www.nigms.nih.gov/Training/Pages/PRAT.aspx

Postdoc applicants must now apply with the NIH Fi2 funding mechanism, and all applications must be submitted via **grants.gov**.

If you are planning to apply, the Office of Education is offering this session to discuss in detail how to prepare for the application submission, and more importantly, provide you with some valuable documents.

Please email Dr. Yvette Pittman at yvette.pittman@nih.gov if you plan to attend.

MONDAY, JULY 31, 2 - 4 PM

<u>SciPhD</u> Workshop for NICHD Fellows: Defining Your Brand! "How to Use Your Total Research Experiences to Make You Business-Ready and Most Qualified for Your First Professional Job"

In this two-hour workshop, we will explore the general and specific skills valued by employers as they select the best-qualified candidate for any job. Each participant will relate specific skills to the experiences gained as an academic scientist, identify any gaps in those experiences and create a career development plan to address those gaps. We will focus on the business skills associated with project planning, innovation, and execution, as well as the social skills that demonstrate an ability to work with others in a diverse team environment.

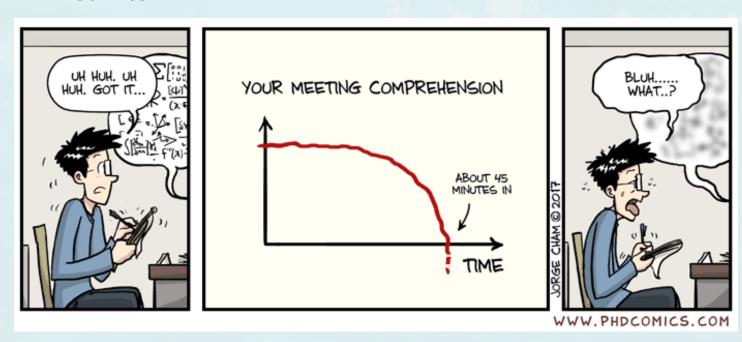
LEARNING OBJECTIVES:

- » Identify scientific, business and social skills valued by professional organizations (academic and non-academic)
- » Relate personal and professional experiences and accomplishments to critical skills
- » Develop a targeted resume that demonstrates these skills
- » Learn effective communications techniques that demonstrate your value, regardless of your audience

For location and registration information, please contact Dr. Yvette Pittman at <u>yvette.</u> <u>pittman@nih.gov</u>.



PHD Comics



http://phdcomics.com/comics/archive.php?comicid=1944

